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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,660	03/01/2002	Michael John Towler	YAMAP0804US	7895

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Neil A. DuChez
Renner, Otto, Boisselle & Sklar
1621 Euclid Avenue, 19th Floor
Cleveland, OH 44115

EXAMINER	
DUONG, THOI V	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,660	TOWLER ET AL.	
	Examiner	Art Unit	
	Thoi V Duong	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-20 and 24-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-20 and 24-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the Amendment, Paper No. 8, filed August 26, 2002.

Accordingly, claim 3 was amended, and claims 2 and 21-23 were cancelled. Currently, claims 1, 3-20 and 24-26 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-10, 12-17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Acosta et al. (EP 0996028A2) in view of Funada et al. (USPN 4,232,947).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and

reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Re claims 1, 3, 4 and 15, as shown in Fig. 1, Acosta et al. discloses a liquid crystal device comprising a nematic liquid crystal 3, voltage means for applying a voltage across said liquid crystal, and two substrates 1, 1' each provided with an alignment layer 2, 2' (col. 1, paragraphs 1-5), wherein, as illustrated in Fig. 9, a modification of Fig. 7:

said liquid crystal is sandwiched between said two substrates;

said nematic liquid crystal can be placed in at least one operating state and at least one non-operating state (cols. 1 and 2, paragraphs 8 and 9); and

at least one of said alignment layers is provided with a plurality of surface protrusions 8, 8' formed from an anisotropic material as shown in Fig. 9 (cols. 13 and 14, paragraphs 81 and 82),

Acosta et al. discloses a liquid crystal device that is basically the same as that recited in claims 1, 3 and 4 except for protrusions having a height which is at least 10% or 20% or substantially 50% of the thickness of the liquid crystal. As shown in Figs. 4-6, Funada et al. discloses a nematic liquid crystal device comprising a multiplicity of

protrusions having an anisotropic profile and the height of 10 through 10,000 Angstroms (1 micrometer) for the purpose of regulating or defining the alignment of the liquid crystal molecules so as to eliminate the degeneration states of the liquid crystal molecules (col. 2, lines 61-66).

As known in the art, the two substrates of the liquid crystal display device are typical 1-6 micrometers apart. Accordingly, if the protrusions have a height of 0.6 or 1 micrometer and the two substrates of the LCD device is 6 or 5 micrometers apart, respectively, the protrusions will have the height which is at least 10% or 20% of the thickness of the liquid crystal. Similarly, if the protrusions have a height of 1 micrometer and the two substrates of the LCD device is 2 micrometers apart, the protrusions will have the height which is substantially 50% of the thickness of the liquid crystal.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Acosta et al. with the teaching of Funada et al. by forming anisotropic protrusions having a height which is at least 10% or 20% or substantially 50% of the thickness of the liquid crystal for the purpose of regulating or defining the alignment of the liquid crystal molecules so as to eliminate the degeneration states of the liquid crystal molecules (col. 2, lines 61-66).

Re claim 15, Acosta et al. discloses that the anisotropic protrusions are formed from a polymerisable reactive mesogen (cols. 13 and 14, paragraphs 81 and 82),

Re claims 5 and 16, Acosta et al. discloses that at least some of said protrusions nucleate said liquid crystal into said operating state from said non-operating state when said voltage exceeds a threshold value and said operating and non-operating states are

topologically distinct from each other (cols. 1 and 2, paragraph 8 and 9; col. 4, paragraph 22; and col. 12, paragraph 73);

Re claim 6, Acosta et al. discloses that at least some of said protrusions isolate said operating state from said non-operating state or from another operating state (col. 12, paragraph 73);

Re claims 7 and 8, Acosta et al. discloses that said liquid crystal is divided into a plurality of pixels each having an active region, and wherein the active region of each said pixel contains, or overlaps with, or lies adjacent or close to, at least one of said protrusions, so that nucleation occurs within said active region and wherein each said pixel is surrounded by at least one of said protrusions, so that the pixel is isolated (Fig. 10 and col. 14, paragraph 83);

Re claims 9 and 10, Acosta et al. discloses that said nematic liquid crystal is a pi-cell or splay bend device (SBD) (col. 1, paragraphs 1-3);

Re claim 17, Acosta et al. discloses that when said voltage is substantially zero different regions of said liquid crystal exist in first non-operating state (region B) and second non-operating state (region A or C), and the first non-operating state is stabilized by said anisotropic protrusions 8, 8' as illustrated in Fig. 9, which is a modification of the device shown in Fig. 7, wherein said first and second non-operating states are V and H states respectively and wherein said first non-operating state is the same state as said operating state (col. 12, paragraph 73).

Re claim 20, Acosta also discloses a method of producing the liquid crystal device in Fig. 9 comprising the steps of forming a reactive mesogen layer 8, 8' on

substrates 1, 1', curing said layer by irradiating said layer with UV light through a mask to leave said one of said substrates coated with anisotropic protrusions, and forming a liquid crystal cell by sandwiching nematic liquid crystal material between said two substrates (col. 14, paragraph 82).

Re claims 12-14, Funada et al. discloses that the protrusions are tilted anisotropy protrusions (col. 3, lines 32-46) or twisted anisotropy protrusions (col. 3, line 61 through col. 4, line 30).

Re claim 24, the protrusions 8, 8' in Fig. 9 of Acosta et al. are trapezoidal anisotropic protrusions.

Finally, re claims 25 and 26, the protrusions in Fig. 4 of Funada et al. are triangular or mitre-shaped anisotropic protrusions.

4. Claims 11 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (EP 0996028A2) in view of Funada et al. (USPN 4,232,947) as applied to claims 1, 3-10, 12-17, 19 and 20 above, and further in view of Ulrich et al. (USPN 6,618,113 B1).

The liquid crystal device of Acosta et al. as modified in view of Funada et al. above includes all that is recited in claims 11 and 18 except for a bistable twisted nematic (BTN).

As shown in Figs. 12 and 16, Ulrich et al. discloses a liquid crystal device comprising a bistable twisted nematic (BTN) liquid crystal layer 23 and twisted anisotropic spacer walls 10 (col. 7, lines 35-46 and col. 9, lines 43-47) so as to avoid substantial reduction in contrast ratio (col. 4, lines 27-32).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the liquid crystal device of Acosta et al. with the teaching of Ulrich et al. by employing a BTN liquid crystal and twisted anisotropic protrusions to create a first non-operating state as T state and improve contrast ratio for the display (col. 4, lines 27-32).

Response to Arguments

5. Applicants' arguments filed Feb. 20, 2004 have been fully considered but they are not persuasive.

Applicants argued that Acosta et al. and Funada et al. teach different ways of aligning the liquid crystal since Acosta et al. employ the mesogen layer to change the alignment of the surface of the liquid crystal layer due to the anisotropic molecular structure of the mesogen protrusions; and, in contrast, Funada et al. employ the construction of micro-grooves to change the angle of the surface of the liquid crystal layer.

The Examiner disagrees with Applicants' remarks since Acosta et al. and Funada et al. are both concerned with alignment layers for affecting alignment at the surface of a liquid crystal layer. Acosta et al. discloses the mesogen layer consists of a plurality of surface protrusions formed of an anisotropic material (cols. 13 and 14, paragraphs 81 and 82). Meanwhile, Funada et al. discloses micro-grooves structure consisting of a plurality of surface protrusions having anisotropic profile. Both of these surface protrusions are useful for the same purpose of affecting alignment of the liquid crystal molecules at the surface of a liquid crystal layer.

Applicants also argued that neither Acosta et al. nor Funada et al. teach or suggest the protrusions having a height of at least 10% of the thickness of the liquid crystal as recited in claim 1. The Examiner agrees with Applicants that Acosta et al. does not disclose the height of the protrusions. Therefore, the reference of Funada et al. is employed for teaching a multiplicity of protrusions having the height of 10 through 10,000 Angstroms (1 micrometer), as shown in Figs. 4 and 5, *for regulating or defining the alignment of the liquid crystal molecules* (col. 2, lines 61-66 and col. 3, lines 1-16). Since the two substrates of a liquid crystal device is typically 1-6 micrometers apart, the height of those protrusions in the range of 10-10,000 Angstroms will be at least 10% or 20% or 50% of the thickness of the liquid crystal (see details in the office action above).

Finally, Applicants argued that Acosta et al. and Funada et al. are both concerned with alignment layers for affecting alignment at the surface of a liquid crystal layer; on the other hand, the present invention is concerned with affecting alignment within the *bulk* of a liquid crystal layer. The Examiner recognizes patentable features of the present invention; however, the features are not clearly recited in the claims to differentiate with Prior Arts, and the combination of Acosta et al. and Funada et al. still meet all limitations recited in the claims.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong

05/15/2004

ROBERT H. KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800